



RAW SEQUENCE LISTING ERROR REPORT

The Biotechnology Systems Branch of the Scientific and Technical Information Center (STIC) detected errors when processing the following computer readable form:

Application Serial Number: 10/659,983
Source: oipe
Date Processed by STIC: 9-22-03

THE ATTACHED PRINTOUT EXPLAINS DETECTED ERRORS.

PLEASE FORWARD THIS INFORMATION TO THE APPLICANT BY EITHER:

- 1) INCLUDING A COPY OF THIS PRINTOUT IN YOUR NEXT COMMUNICATION TO THE APPLICANT, WITH A NOTICE TO COMPLY or,
- 2) TELEPHONING APPLICANT AND FAXING A COPY OF THIS PRINTOUT, WITH A NOTICE TO COMPLY

FOR CRF SUBMISSION AND PATENTIN SOFTWARE QUESTIONS, PLEASE CONTACT MARK SPENCER, 703-308-4212.

TO REDUCE ERRORED SEQUENCE LISTINGS, PLEASE USE THE CHECKER VERSION 4.0 PROGRAM, ACCESSIBLE THROUGH THE U.S. PATENT AND TRADEMARK OFFICE WEBSITE. SEE BELOW FOR ADDRESS:

<http://www.uspto.gov/web/offices/pac/checker>

Applicants submitting genetic sequence information electronically on diskette or CD-Rom should be aware that there is a possibility that the disk/CD-Rom may have been affected by treatment given to all incoming mail.

Please consider using alternate methods of submission for the disk/CD-Rom or replacement disk/CD-Rom.

Any reply including a sequence listing in electronic form should NOT be sent to the 20231 zip code address for the United States Patent and Trademark Office, and instead should be sent via the following to the indicated addresses:

1. EFS-Bio (<<http://www.uspto.gov/efc/efs/downloads/documents.htm>> , EFS Submission User Manual - ePAVE)
2. U.S. Postal Service: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450
3. Hand Carry directly to:
U.S. Patent and Trademark Office, Technology Center 1600, Reception Area, 7th Floor, Examiner Name, Sequence Information, Crystal Mall One, 1911 South Clark Street, Arlington, VA 22202
Or
U.S. Patent and Trademark Office, Box Sequence, Customer Window, Lobby, Room 1B03, Crystal Plaza Two, 2011 South Clark Place, Arlington, VA 22202
4. Federal Express, United Parcel Service, or other delivery service to: U.S. Patent and Trademark Office, Box Sequence, Room 1B03-Mallroom, Crystal Plaza Two, 2011 South Clark Place, Arlington, VA 22202

Revised 04/24/2003

Raw Sequence Listing Error Summary

ERROR DETECTED

SUGGESTED CORRECTION

SERIAL NUMBER: 10/659,983

ATTN: NEW RULES CASES: PLEASE DISREGARD ENGLISH "ALPHA" HEADERS, WHICH WERE INSERTED BY PTO SOFTWARE

- 1 ☐ Wrapped Nucleics
 Wrapped Aminos The number/text at the end of each line "wrapped" down to the next line. This may occur if your file was retrieved in a word processor after creating it. Please adjust your right margin to .3; this will prevent "wrapping."

- 2 ☐ Invalid Line Length The rules require that a line not exceed 72 characters in length. This includes white spaces.

- 3 ☐ Misaligned Amino
 Numbering The numbering under each 5th amino acid is misaligned. Do not use tab codes between numbers; use space characters, instead.

- 4 ☐ Non-ASCII The submitted file was not saved in ASCII(DOS) text, as required by the Sequence Rules. Please ensure your subsequent submission is saved in ASCII text.

- 5 ☐ Variable Length Sequence(s) contain n's or Xaa's representing more than one residue. Per Sequence Rules, each n or Xaa can only represent a single residue. Please present the maximum number of each residue having variable length and indicate in the <220>-<223> section that some may be missing.

- 6 ☐ PatentIn 2.0
 "bug" A "bug" in PatentIn version 2.0 has caused the <220>-<223> section to be missing from amino acid sequences(s). Normally, PatentIn would automatically generate this section from the previously coded nucleic acid sequence. Please manually copy the relevant <220>-<223> section to the subsequent amino acid sequence. This applies to the mandatory <220>-<223> sections for Artificial or Unknown sequences.

- 7 ☐ Skipped Sequences
 (OLD RULES) Sequence(s) missing. If intentional, please insert the following lines for each skipped sequence:
 (2) INFORMATION FOR SEQ ID NO:X: (insert SEQ ID NO where "X" is shown)
 (i) SEQUENCE CHARACTERISTICS: (Do not insert any subheadings under this heading)
 (xi) SEQUENCE DESCRIPTION:SEQ ID NO:X: (insert SEQ ID NO where "X" is shown)
 This sequence is intentionally skipped

 Please also adjust the "(ii) NUMBER OF SEQUENCES:" response to include the skipped sequences.

- 8 ☐ Skipped Sequences
 (NEW RULES) Sequence(s) missing. If intentional, please insert the following lines for each skipped sequence.
 <210> sequence id number
 <400> sequence id number
 000

- 9 ☐ Use of n's or Xaa's
 (NEW RULES) Use of n's and/or Xaa's have been detected in the Sequence Listing.
 Per 1.823 of Sequence Rules, use of <220>-<223> is MANDATORY if n's or Xaa's are present.
 In <220> to <223> section, please explain location of n or Xaa, and which residue n or Xaa represents.

- 10 ☒ Invalid <213>
 Response Per 1.823 of Sequence Rules, the only valid <213> responses are: Unknown, Artificial Sequence, or scientific name (Genus/species). <220>-<223> section is required when <213> response is Unknown or is Artificial Sequence

- 11 ☐ Use of <220> Sequence(s) missing the <220> "Feature" and associated numeric identifiers and responses.
 Use of <220> to <223> is MANDATORY if <213> "Organism" response is "Artificial Sequence" or "Unknown." Please explain source of genetic material in <220> to <223> section.
 (See "Federal Register," 07/01/1998, Vol. 63, No. 104, pp. 29631-32) (Sec. 1.823 of Sequence Rules)

- 12 ☐ PatentIn 2.0
 "bug" Please do not use "Copy to Disk" function of PatentIn version 2.0. This causes a corrupted file, resulting in missing mandatory numeric identifiers and responses (as indicated on raw sequence listing). Instead, please use "File Manager" or any other manual means to copy file to floppy disk.

- 13 ☐ Misuse of n/Xaa "n" can only represent a single nucleotide; "Xaa" can only represent a single amino acid



OICE

RAW SEQUENCE LISTING

DATE: 09/22/2003

PATENT APPLICATION: US/10/659,983

TIME: 14:19:07

Input Set : A:\81289-284779.ST25.txt

Output Set: N:\CRF4\09222003\J659983.raw

3 <110> APPLICANT: Hovanec, Timothy A
 5 <120> TITLE OF INVENTION: Ammonia-Oxidizing Bacteria
 7 <130> FILE REFERENCE: 81289-284779
 C--> 9 <140> CURRENT APPLICATION NUMBER: US/10/659,983
 C--> 9 <141> CURRENT FILING DATE: 2003-09-10

9 <150> PRIOR APPLICATION NUMBER: US 09/573,684
 10 <151> PRIOR FILING DATE: 2000-05-19
 12 <150> PRIOR APPLICATION NUMBER: US 60/386,217
 13 <151> PRIOR FILING DATE: 2002-09-19
 15 <150> PRIOR APPLICATION NUMBER: US 60/386,218
 16 <151> PRIOR FILING DATE: 2002-09-19
 18 <150> PRIOR APPLICATION NUMBER: US 60/386,219
 19 <151> PRIOR FILING DATE: 2002-09-19

21 <160> NUMBER OF SEQ ID NOS: 23
 23 <170> SOFTWARE: PatentIn version 3.2
 25 <210> SEQ ID NO: 1
 26 <211> LENGTH: 1457

27 <212> TYPE: DNA

28 <213> ORGANISM: AOB Type A R7clone140 16S rDNA (SEQ ID NO:1)

30 <400> SEQUENCE: 1

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 33 ctggtggcga gtggcggacg ggtgagtaac gcatcggaac gtatccagaa gaggggggta 120
 35 acgcatcgaa agatgtgcta ataccgcata tactctaagg aggaaagcag gggatcgaaa 180
 37 gaccttgccg ttttggagcg gccgatgtct gattagctag ttggtggggg aaaggcctac 240
 39 caaggcgacg atcagtagtt ggtctgagag gacgaccagc cacactggga ctgagacacg 300
 41 gccagactc ctacgggagg cagcagtggt gaattttgga caatgggccc aagcctgatc 360
 43 cagcaatgcc gcgtgagtga agaaggcctt cgggttgtaa agctctttca gtcgagaaga 420
 45 aaaggttacg gtaataatc gtgactcatg acggtatcga cagaagaagc accgggtaac 480
 47 tacgtgccag cagccgcggg aatacgtagg gtgcaagcgt taatcggaat tactgggcgt 540
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 51 tgcgtttgaa actacaaggc tagagtgtgg cagagggagg tggaattcca tgtgtagcag 660
 53 tgaaatgcgt agagatatgg aagaacatcg atggcgaagg cagcctcctg gggttaacact 720
 55 gacgctcatg cagaaaagcg tggggagcaa acaggattag ataccctggt agtccacgcc 780
 57 ctaaacgatg tcaactagtt gttgggcctt attaggcttg gtaacgaagc taacgcgtga 840
 59 agttgaccgc ctggggagta cggctcgcaag attaaaactc aaaggaattg acggggaccc 900
 61 gcacaagcgg tggattatgt ggattaattc gatgcaacgc gaaaaacctt acctaccctt 960
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 65 catggctgtc gtcagctcgt gtcgtgagat gttgggttaa gtcccgcaac gagcgcaacc 1080
 67 cttgtcatta attgccatca tttgggttgg cactttaatg agactgccgg tgacaaaccg 1140
 69 gaggaagggt gggatgacgt caagtccctc tggcccttat gggtagggct tcacacgtaa 1200
 71 tacaatggcg cgtacagagg gttgccaaac cgcgaggggg agctaattctc agaaagcgcg 1260
 73 tcgtagtccg gatcgaggtc tgcaactcga ctccgtgaag tcggaatcgc tagtaatcgc 1320
 75 ggatcagcat gtcgcgggtga atacgttccc ggggtcttgta cacaccgccc gtcacaccat 1380

**Does Not Comply
 Corrected Diskette Need d**

See item 10
 on error summary
 sheet.

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Input Set : A:\81289-284779.ST25.txt

Output Set: N:\CRF4\09222003\J659983.raw

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79 gattcatgac tggggtg 1457
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83 <211> LENGTH: 1457
84 <212> TYPE: DNA
85 <213> ORGANISM: AOB Type A1 R7clone187 16S rDNA (SEQ ID NO:2)
87 <400> SEQUENCE: 2
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90 ctggtggcga gtggcgacg ggtgagtaac gcatcggaac gtatccagaa gaggggggta 120
92 acgcatcgaa agatgtgcta ataccgata tactctaagg aggaaagcag gggatcgaaa 180
94 gaccttgccg ttttgagcg gccgatgtct gattagctag ttggtggggt aaaggcctac 240
96 caaggcgacg atcagtagtt ggtctgagag gacgaccagc cactactggga ctgagacacg 300
98 gccagactc ctacgggagg cagcagtggg gaattttgga caatgggcgc aagcctgatc 360
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110 tgaaatgcgt agagatatgg aagaacatcg atggcgaagg cagcctcctg ggtaaacact 720
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114 ctaaacgatg tcaactagtt gttgggcctt attaggcttg gtaacgaagc taacgcgtga 840
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118 gcacaagcgg tggattatgt ggattaattc gatgcaacgc gaaaaacctt acctaccctt 960
120 gacatgtagc gaattttcta gagatagatt agtgcttcgg gaacgctaac acaggtgctg 1020
122 catggctgtc gtcagctcgt gtcgtgagat gttgggttaa gtcccgaac gacgcgaacc 1080
124 cttgtcatta attgccatca tttggttggg cactttaatg agactgccg tgacaaaccg 1140
126 gaggaagggt gggatgacgt caagtcctca tggcccttat gggtagggct tcacacgtaa 1200
128 tacaatggcg cgtacagagg gttgccaacc cgcgaggggg agctaattc agaaagcgcg 1260
130 tcgtagtccg gatcggagtc tgcaactcga ctccgtgaag tcggaatcgc tagtaatcgc 1320
132 ggatcagcat gtcgcggtga atacgttccc gggctttgta cacaccgcc gtcacaccat 1380
134 gggagtgggt ttcaccagaa gcaggtagtc taaccgtaag gagggcgctt gccacggtga 1440
136 gattcatgac tggggtg 1457
139 <210> SEQ ID NO: 3
140 <211> LENGTH: 1458
141 <212> TYPE: DNA
142 <213> ORGANISM: AOB Type B R3clone5 16S rDNA (SEQ ID NO:3) Same
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145 attgaacgct ggcggcatgc tttacacatg caagtcgaac ggcagcacgg gggcaaccct 60
147 ggtggcgagt ggcgaacggg tgagtaatac atcggaacgt atcttcgagg gggggataac 120
149 gcaccgaaag gtgtgcta atccgataat ctccacggag aaaagcagg gatcgcaaga 180
151 ccttgcgctc ttggagcggc cgatgtctga ttagctagtt ggtgaggtaa tggcttacca 240
153 aggcgacgat cagttagctg tctgagagga cgaccagcca cactgggact gagacacggc 300
155 ccagactcct acgggaggca gcagtggga attttgaca atgggggaaa ccctgatcca 360
157 gccatgccgc gtgagtgaag aaggccttcg ggttgtaaag ctctttcagc cggaacgaaa 420
159 cggtcacggc taataccggt gactactgac ggtaccgga gaagaagcac cggctaacta 480
161 cgtgccagca gccgcggtaa tacgtaggtt gcaagcgtaa atcggaatta ctgggcgtaa 540
163 agcgtgcgca ggcggttttg taagtcagat gtgaaagccc cgggcttaac ctgggaactg 600
165 cgtttgaaac tacaaggcta gagtgtggca gaggggggtg gaattccacg tgtagcagtg 660
167 aaatgcgtag agatgtggag gaacaccgat ggcgaaggca gcccctggg ttaacaccga 720

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RAW SEQUENCE LISTING

DATE: 09/22/2003

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Input Set : A:\81289-284779.ST25.txt

Output Set: N:\CRF4\09222003\J659983.raw

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169 cgctcaggca cgaaagcgtg gggagcaaac aggattagat accctggtag tccacgccct 780
171 aaacgatgtc aactagttgt cgggtcttaa cggacttggt aacgcagcta acgcgtgaag 840
173 ttggccgcct ggggagtagc gtcgcaagat taaaactcaa aggaattgac ggggacccgc 900
175 acaagcgggtg gattatgttg attaattcga tgcaacgcga aaaaccttac ctacccttga 960
177 catgtaccga agcccgcgga gaggtgggtg tgcccgaag ggagcggtaa cacagggtgt 1020
179 gcatggctgt cgtcagctcg tgtcgtgaga tggtgggtta agtcccga caagcgcaac 1080
181 ccttgctatt aattgccatc attcagtttg gcactttaat gaaactgccg gtgacaaacc 1140
183 ggaggaaggt ggggatgacg tcaagtcctc atggccctta tgggtagggc ttcacacgta 1200
185 atacaatggc gcgtacagag ggttgccaac ccgcgagggg gagctaattct cagaaagcgc 1260
187 gtcgtagtcc ggatcggagt ctgcaactcg actccgtgaa gtcggaatcg ctagtaatcg 1320
189 cggatcagca tgtcgcggtg aatacgttcc cgggtcttgt acacaccgcc cgtcacacca 1380
191 tgggagtggg tttcaccaga agcaggtagt ctaaccgcaa ggagggcgct tgccacgggtg 1440
193 agattcatga ctgggggtg 1458

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196 <210> SEQ ID NO: 4

197 <211> LENGTH: 1460

198 <212> TYPE: DNA

199 <213> ORGANISM: AOB Type C R5clone47 16S rDNA (SEQ ID NO:4) *same*

201 <400> SEQUENCE: .4

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202 attgaacgct ggcggcatgc tttacacatg caagtccaac ggcagcgggg gcttcggcct 60
204 gccggcgagt ggcgaacggg tgagtaatac atcggaacgt gtccttaagt ggggaataac 120
206 gcatcgaaag atgtgctaata accgcataat tctgaggaga aaagcagggg atcgcaagac 180
208 cttgcgctaa aggagcggcc gatgtctgat tagctagttg gtggggtaaa ggcttaccaa 240
210 ggcaacgata agtagttggt ctgagaggac gaccaaccac actgggactg agacacggcc 300
212 cagactccta cgggaggcag cagtggggaa ttttgacaa tgggcgaaa cctgatccag 360
214 ccatgccgcg tgagtgaaga aggccttcgg gttgtagagc tcttttagtc agaaagaaa 420
216 aatcatgatg aataattatg atttatgacg gtactgacag aaaaagcacc ggctaactac 480
218 gtgccagcag ccgcggtaat acgtagggtg cgagcgtaaa tcggaattac tgggcgtaaa 540
220 ggggtgcgcag gcggttttgt aagtcagatg tgaaagcccc gggcttaacc tgggaattgc 600
222 gtttgaaact acaaggctag agtgcagcag aggggagtgg aattccatgt gtagcagtga 660
224 aatgcgtaga gatgtggaag aacaccgatg gcgaaggcag ctccctgggt tgacactgac 720
226 gctcatgcac gaaagcgtgg ggagcaaaca ggattagata ccctggtagt ccacgcccta 780
228 aacgatgtca actggttgct ggatctaatt aaggatttgg taacgtagct aacgcgtgaa 840
230 gttgaccgcc tggggagtac ggtcgcaaga ttaaaactca aaggaattga cggggacccg 900
232 cacaagcggg ggattatgtg gattaattcg atgcaacgcg aaaaacctta cctacccttg 960
234 acatgcttgg aatctagtgg agacataaga gtgcccgaag gggagccaag acacaggtgc 1020
236 tgcattgctg tcgtcagctc gtgtcgtgag atgttggtt aagtcgccga acgagcgcaa 1080
238 cccttgctac taattgctat cattctaaat gagcacttta gtgagactgc cggtgacaaa 1140
240 ccggaggaag gtggggatga cgtcaagtc tcatggccct tatgggtagg gcttcacacg 1200
242 taatacaatg gcgtgtacag agggttgcca accgcgagg gggagccaat ctcaaaaagc 1260
244 acgtcgtagt ccggtcgga gtctgcaact cgactccgtg aagtcggaat cgctagtaat 1320
246 cgcggatcag catgccgcgg tgaatacgtt cccgggtctt gtacacaccg cccgtcacac 1380
248 catgggagtg gttttcacca gaagcaggta gtttaaccgt aaggaggacg cttgccacgg 1440
250 tgggggtcat gactgggggtg 1460

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253 <210> SEQ ID NO: 5

254 <211> LENGTH: 18

255 <212> TYPE: DNA

256 <213> ORGANISM: Oligonucleotide Probe (SEQ ID NO:5) *see item 10*

258 <400> SEQUENCE: 5

259 cccccctctt ctggatac

*on error
summary
report*

18

RAW SEQUENCE LISTING

PATENT APPLICATION: US/10/659,983

DATE: 09/22/2003

TIME: 14:19:07

Input Set : A:\81289-284779.ST25.txt

Output Set: N:\CRF4\09222003\J659983.raw

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262 <210> SEQ ID NO: 6
263 <211> LENGTH: 18
264 <212> TYPE: DNA
265 <213> ORGANISM: PCR primer (SEQ ID NO:6)
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268 cggaacgtat ccagaaga
271 <210> SEQ ID NO: 7
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273 <212> TYPE: DNA
274 <213> ORGANISM: PCR primer (SEQ ID NO:7)
276 <400> SEQUENCE: 7
277 atctctagaa aattcgct
280 <210> SEQ ID NO: 8
281 <211> LENGTH: 19
282 <212> TYPE: DNA
283 <213> ORGANISM: Oligonucleotide probe (SEQ ID NO:8)
285 <400> SEQUENCE: 8
286 tcccccactc gaagatacg
289 <210> SEQ ID NO: 9
290 <211> LENGTH: 17
291 <212> TYPE: DNA
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295 atcggaacgt atcttcg
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301 <213> ORGANISM: PCR primer (SEQ ID NO:10)
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307 <210> SEQ ID NO: 11
308 <211> LENGTH: 19
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310 <213> ORGANISM: PCR primer (SEQ ID NO:11)
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316 <210> SEQ ID NO: 12
317 <211> LENGTH: 19
318 <212> TYPE: DNA
319 <213> ORGANISM: PCR primer (SEQ ID NO:12)
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322 gtctccayta gattccaag
325 <210> SEQ ID NO: 13
326 <211> LENGTH: 17
327 <212> TYPE: DNA
328 <213> ORGANISM: PCR primer (SEQ ID NO:13)
330 <400> SEQUENCE: 13
331 gtttgatcct ggctcag
334 <210> SEQ ID NO: 14

```

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Same error

RAW SEQUENCE LISTING

DATE: 09/22/2003

PATENT APPLICATION: US/10/659,983

TIME: 14:19:07

Input Set : A:\81289-284779.ST25.txt

Output Set: N:\CRF4\09222003\J659983.raw

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336 <212> TYPE: DNA
337 <213> ORGANISM: PCR primer (SEQ ID NO:14)
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343 <210> SEQ ID NO: 15
344 <211> LENGTH: 17
345 <212> TYPE: DNA
346 <213> ORGANISM: PCR primer (SEQ ID NO:15)
348 <400> SEQUENCE: 15
349 cctacgggag gcagcag 17
352 <210> SEQ ID NO: 16
353 <211> LENGTH: 18
354 <212> TYPE: DNA
355 <213> ORGANISM: PCR primer (SEQ ID NO:16)
357 <400> SEQUENCE: 16
358 gwattaccgc ggckgctg 18
361 <210> SEQ ID NO: 17
362 <211> LENGTH: 20
363 <212> TYPE: DNA
364 <213> ORGANISM: PCR primer (SEQ ID NO:17)
366 <400> SEQUENCE: 17
367 cactctagcy ttgtagtctc 20
370 <210> SEQ ID NO: 18
371 <211> LENGTH: 1467
372 <212> TYPE: DNA
373 <213> ORGANISM: N. Aestuarii-like AOB P4clone42 16S rDNA (SEQ ID NO:18)
375 <400> SEQUENCE: 18
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378 cacgggtgct tgcacctggg ggcgagtggc ggacgggtga gtaatgcatc ggaacgtgtc 120
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382 agcaggggat cgaaagacct tgtgcttttg gagcggccga tgcctgatta gctagtgtgt 240
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394 gaattactgg gcgtaaaggg tgcgcaggcg gctttgtaag tcagatgtga aatccccggg 600
396 cttaacctgg gaattgcgtt tgaaactaca aagctagagt gtagcagagg ggggtggaat 660
398 tccatgtgta gcagtgaat gcgtagagat atggaagaac atcgatggcg aaggcagccc 720
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412 gcaacgagcg caacccttgt cattaattgc catcatttag ttgggcactt taatgagact 1140
414 gccggtgaca aaccggagga aggtggggat gacgtcaagt cctcatggcc cttatgggta 1200
416 gggcttcaca cgtaatacaa tggcgcgtac agagggttgc caaccgcga gggggagcta 1260

```

VERIFICATION SUMMARY

PATENT APPLICATION: US/10/659,983

DATE: 09/22/2003

TIME: 14:19:08

Input Set : A:\81289-284779.ST25.txt

Output Set: N:\CRF4\09222003\J659983.raw

L:9 M:270 C: Current Application Number differs, Replaced Current Application No
L:9 M:271 C: Current Filing Date differs, Replaced Current Filing Date